

Searches and Latest Results for the Isotropic Gravitational-Wave Backgrounds with LIGO-Virgo-KAGRA detectors

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The gravitational-wave background (GWB) is a superposition of individually unresolved gravitational-wave (GW) signals arising from both astrophysical and cosmological sources accumulated throughout cosmic history. We refer to the GWB as “stochastic” as it can be characterized statistically as a mean zero stochastic field. For the isotropic GWB search considered here, the GWB is further assumed to be stationary, isotropic, and unpolarized. Detecting a stochastic GWB can provide information about astrophysical source populations and processes in the early Universe. In this talk, I will introduce the analysis methods, including the cross-correlation spectra, frequency estimator and parameter estimation, and present the latest results using LIGO–Virgo–KAGRA data through April 2025.

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